UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/578,047	08/07/2007	Joachim Mai	F-9089	5426

28107 7590 04/20/2011

JORDAN AND HAMBURG LLP
122 EAST 42ND STREET
SUITE 4000
NEW YORK, NY 10168

EXAMINER	
MCDONALD, RODNEY GLENN	

ART UNIT	PAPER NUMBER
1724	

MAIL DATE	DELIVERY MODE
04/20/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/578,047	MAI ET AL.	
	Examiner	Art Unit	
	Rodney G. McDonald	1724	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 February 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *8-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *8-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 8, 9, 11, 12, 14, 16 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen et al. (U.S. Pat. 3,699,334) in view of Smirnov et al. (U.S. Pat. 6,274,007).

Regarding claim 8, Cohen et al. teach a method of ion beam processing of a surface of a substrate. Cohen et al. teach positioning the substrate relative to an ion beam that is generated by an ion beam source. Cohen et al. teach partially processing a known property pattern of the surface of the substrate by the ion beam such that a new technologically defined property pattern is formed. Cohen et al. teach adjusting a

current geometric action pattern of the ion beam on the surface of the substrate as a function of the known property pattern and of the new technologically defined property pattern, and as a function of the method progress by at least one of modifying the beam characteristics or by pulsing the ion beam. Measure a current geometric action pattern of the ion beam with an interferometer during processing of the substrate. Adjusting the geometric action pattern of the ion beam based on measured geometric action pattern and the known pattern properties. The adjusting comprising varying local ion current density distributions within an ion beam cross section, thereby causing a corresponding variation of ion energy distribution at defined surface area regions of the substrate that ions of the ion beam act upon. (Column 3 lines 9-27; Column 3 lines 35-44; Column 3 lines 60-68; Column 4 lines 1-47; Column 5 lines 14-68; Column 6 lines 1-68; Column 7 lines 1-46; see especially Column 4 lines 1-21 and Column 5 lines 14-56)

Regarding claim 9, Cohen et al. teach the substrate and the ion beam source rotate relative to one another and/or are moved uniformly or non-uniformly linearly, in a circle, or in a technologically pre-specified direction. (Column 4 lines 48-68; Column 5 lines 1-13)

Regarding claim 11, Cohen et al. teach the angle between a surface normal of the surface of the substrate to be processed and the axis of the ion beam striking the surface is modified. (Column 3 lines 43-44; Column 4 lines 44-47; Column 6 lines 37-42; Changing the angle by electrostatic beam steering)

Regarding claim 12, Cohen et al. teach the ion beam source is a wide beam ion source. (Column 4 lines 22-27)

Regarding claim 22, Cohen et al. teach varying ion acceleration, ion energy distribution, ion current density, and ion density distribution of the ion beam; wherein the adjusting the geometric action pattern is performed as a function of the known pattern of properties, the method progression, and the current geometric action pattern of the ion beam to achieve the new technically defined pattern of properties. (Column 4 lines 6-21; Column 5 lines 33-56; Fig. 2)

The difference not yet discussed is the current geometric action pattern of the ion beam on the surface of the substrate is measured during the course of the method by an ion probe array that is arranged in a plane of the surface of the substrate to be processed (Claims 8, 14, 16).

Regarding claims 8, 14, 16, Smirnov et al. teach the current geometric action pattern of the ion beam on the surface of the substrate is measured during the course of the method by an ion probe array that is arranged in a plane of the surface of the substrate to be processed. (Column 4 lines 50-56; Column 5 lines 1-11)

The motivation for utilizing the features of Smirnov et al. is that it allows for determining the end of sputtering. (Column 4 lines 50-56).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Cohen et al. by utilizing the features of Smirnov et al. because it allows for determining the end of sputtering.

Claims 10, 13, 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen et al. in view of Smirnov et al. as applied to claims 8, 9, 11,

12, 14, 16 and 22 above, and further in view of Reade et al. (U.S. Pat. 6,809,066) or Muraki et al. (EP 1 253 619 A2).

Cohen et al. in view of Smirnov et al. is discussed above and all is as applies above. The combination suggests the limitation of claims 15 and 17. (See Cohen et al. and Smirnov et al. discussed above)

Regarding claim 13, modifying the angle is already discussed by Cohen et al. (See Cohen et al. discussed above)

The difference not yet discussed is the ion beam formed from at least two individual ion beams having respective beam characteristics which are controlled synchronously or independent of one another and/or pulsed simultaneously or temporally offset from one another is not discussed (Claim 10).

Regarding claim 10, Reade et al. teach the utilizing two ion beams for texturing the substrate which are controlled to be synchronous from one another. (Column 3 lines 36-46; Column 13 lines 45-65)

Regarding claim 13, Muraki et al. teach utilizing multiple beams synchronously. (Paragraphs 0001, 0020, 0029-0038, 0042, 0044, 0056)

The motivation for utilizing the features of Reade et al. is that it allows for forming the desired texture. (Column 13 lines 11-15)

The motivation for utilizing the features of Muraki et al. is that it allows for performing a process for high precision. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Reade et al. or Muraki et al.

because it allows for forming the desired texture or performing a process for high precision.

Claims 18, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Itoh et al. (U.S. Pat. 5,223,109) in view of Smirnov et al. (U.S. Pat. 6,274,007) and Cohen et al. (U.S. Pat. 3,699,334).

Regarding claim 18, Itoh et al. teach an apparatus for ion beam processing of a surface of a substrate comprising a substrate support for mounting at least one substrate presenting the surface, the substrate support being disposed within a vacuum chamber and being movable in a Y axis and in an X axis; and an ion beam source being mounted in a wall of the vacuum chamber such that an axis of an ion beam from the ion beam source is perpendicular to the surface of the substrate to be processed in a Z axis such that a distance from the ion beam source to the surface of the substrate is fixed. (Figs. 1, 9; Column 3 lines 46-48; Column 4 lines 1-9)

Regarding claim 20, Itoh et al. teach the ion beam source to be a wide beam ion source. (Column 3 line 65)

The differences between Itoh et al. and the present claims is that utilizing an ion probe array to measure the current geometric action pattern of the ion beam is not discussed (Claim 18), means for adjusting the geometric action pattern of the ion beam based on the measured geometric action pattern and a known pattern of properties of the substrate surface, the adjusting means varying local ion current density distributions within an ion beam cross section, thereby causing a corresponding variation of ion energy distribution at defined surface area regions of the substrate that ions of the ion

beam act upon is not discussed (Claim 18) and the ion probe arranged in a plane of the surface of the substrate to be processed is not discussed (Claim 21).

Regarding utilizing an ion probe array to measure the current geometric action pattern of the ion beam (Claim 18), Smirnov et al. teach an ion probe array to measure the current geometric action pattern. (See Smirnov et al. discussed above)

Regarding means for adjusting the geometric action pattern of the ion beam based on the measured geometric action pattern and a known pattern of properties of the substrate surface, the adjusting means varying local ion current density distributions within an ion beam cross section, thereby causing a corresponding variation of ion energy distribution at defined surface area regions of the substrate that ions of the ion beam act upon (Claim 18), Cohen et al. teach means for adjusting the geometric action pattern of the ion beam based on the measured geometric action pattern and a known pattern of properties of the substrate surface, the adjusting means varying local ion current density distributions within an ion beam cross section, thereby causing a corresponding variation of ion energy distribution at defined surface area regions of the substrate that ions of the ion beam act upon. (Column 4 lines 1-21; Column 5 lines 14-56; Fig. 2)

Regarding claim 21, Smirnov et al. teach the ion probe arranged in a plane of the surface of the substrate to be processed. (See Smirnov et al. discussed above)

The motivation for utilizing the features of Smirnov et al. is that it allows for determining the end of sputtering. (Column 4 lines 50-56).

The motivation for utilizing the features of Cohen et al. is that it allows for controllably eroding surfaces. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Itoh et al. by utilizing the features of Smirnov et al. and Cohen et al. because it allows for determining the end of sputtering and controllably eroding surfaces.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Itoh et al. in view of Smirnov et al. and Cohen et al. as applied to claims 18, 20, 21 above, and further in view of Reade et al. (U.S. Pat. 6,809,066) or Muraki et al. (EP 1 253 619 A2).

The difference not yet discussed is the ion beam formed from at least two individual ion beams having respective beam characteristics which are controlled synchronously or independent of one another and/or pulsed simultaneously or temporally offset from one another is not discussed (Claim 19).

Regarding claim 19, Reade et al. teach the utilizing two ion beams for texturing the substrate which are controlled to be synchronous form one another. (Column 3 lines 36-46; Column 13 lines 45-65)

Regarding claim 19, Muraki et al. teach utilizing multiple beams synchronously. (Paragraphs 0001, 0020, 0029-0038, 0042, 0044, 0056)

The motivation for utilizing the features of Reade et al. is that it allows for forming the desired texture. (Column 13 lines 11-15)

The motivation for utilizing the features of Muraki et al. is that it allows for performing a process for high precision. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Reade et al. or Muraki et al. because it allows for forming the desired texture or performing a process for high precision.

Response to Arguments

Applicant's arguments filed February 14, 2011 have been fully considered but they are not persuasive.

In response to the argument that the prior art does not teach adjusting a geometric action pattern of an ion beam based on both a measured geometric action pattern and a substrate surface's known pattern of properties to achieve a new set of properties, it is argued that Cohen et al. teach adjusting a geometric action pattern of an ion beam (Cohen et al. Column 3 lines 45-65) based on a measured geometric action pattern and a substrate surface's known pattern of properties to achieve a new set of properties (Cohen et al. Column 5 lines 34-58; Column 3 lines 39-40). (See Cohen et al. discussed above)

In response to the argument that the prior art does not teach adjusting by varying current density distributions of an ion beam, it is argued that Cohen et al. teach adjusting by varying current density distribution of an ion beam. (Cohen et al. Column 4 lines 1-21)

In response to the argument that the prior art does not teach varying the ion current density distributions occurring at various portions of an ion beam cross section, it is argued that Cohen et al. teach varying the ion current density distribution at various

portions of an ion beam cross section because Cohen et al. teach the energy distribution of the ion beam to be Gaussian. (Cohen et al. Column 4 lines 1-21)

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M-Th with every Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith D. Hendricks can be reached on 571-272-1401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Rodney G. McDonald/
Primary Examiner, Art Unit 1724

Rodney G. McDonald
Primary Examiner
Art Unit 1724

RM
April 18, 2011